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**An Analysis on Relationship between Supply and Use of Public Parking Facilities  
in City Center of Suburb Areas**

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**Synopsis**

Nowadays, social problems caused by increasing automobiles, such as traffic congestion, environmental pollution, and traffic accident have become more serious, especially in the city center of suburb area. Therefore, the activity of city center has declined. Then in this paper, the relationship between supply and use of public parking facilities is analyzed, to investigate the suitable spaces and location of parking facilities. As a result, the basic information to evaluate the transport policies in the city center of suburb areas came out of this analysis.

**KEY WORDS:** city center, parking facility, urban activity, accessibility

**1. Introduction**

In the city center of suburb area, some problems caused by automobiles have become remarkable. Especially many on-road parking vehicles have deteriorated such problems. Then remarkably huge of parking facilities have been supplied to decrease the on-road parking vehicles. By the way, the supply of parking facilities in the city center must be considered to permit or welcome car use there. However this trend should be against the mitigation of the bad conditions caused by automobiles. From the viewpoint of suitable urban activity of aging society in near future, it should not be generally desirable to encourage the activities supported by automobiles.

Therefore, the space and location of parking facilities supplied by local government were surveyed in the city center of suburb areas of Osaka Prefecture. In addition, the change of usage condition of parking facilities and the demand or behavior and intention of drivers were surveyed and analyzed, in order to investigate the suitable spaces and location of parking facilities in the city center.

**2. Actual condition of supply and use of parking facilities**

In the city center of suburb area, the share of car trips is higher than the average of Osaka Pref, in both access trips (4%: 3%) and main trips (25%: 23%). According to these traffic activities, the demand of parking facilities may be expected 1 million vehicles/day, in spite of only 300 thousands spaces provided by the Master Plan of Parking Spaces in Osaka Prefecture, 1994 (See **Figure-1**). Therefore there may be

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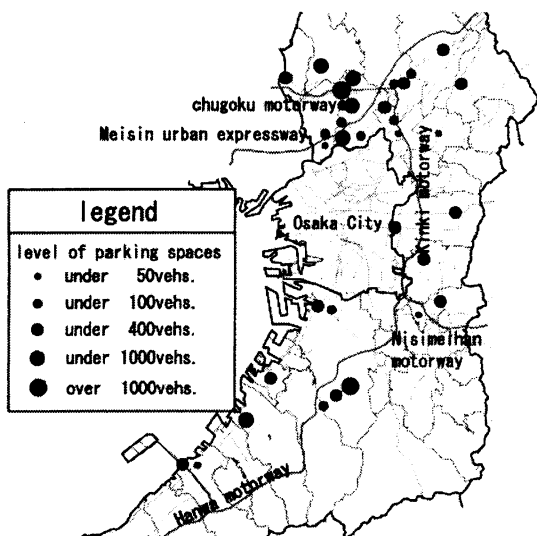
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parking facilities may be expected 1 million vehicles/day, in spite of only 300 thousands spaces provided by the Master Plan of Parking Spaces in Osaka Prefecture, 1994. See **Figure-1**. Therefore there may be estimated to occur 200-400 thousands of them as the on-road parking vehicles.

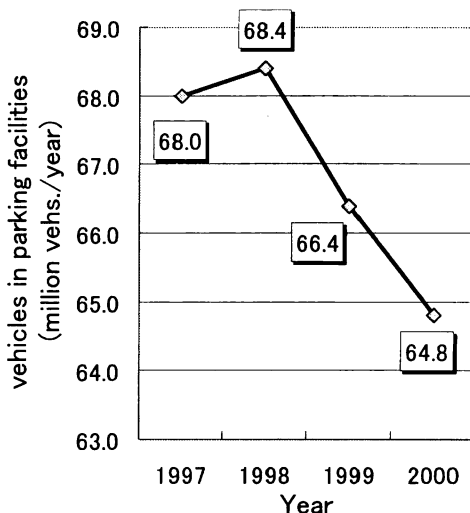
This situation must occur the heavy congestion and also environmental pollution as well as traffic accidents. Then, in this study, the relationship between supply and use of public parking facilities in 29-areas was analyzed from 1997 to 2000.

Based on this analysis, three major findings came out as follows;

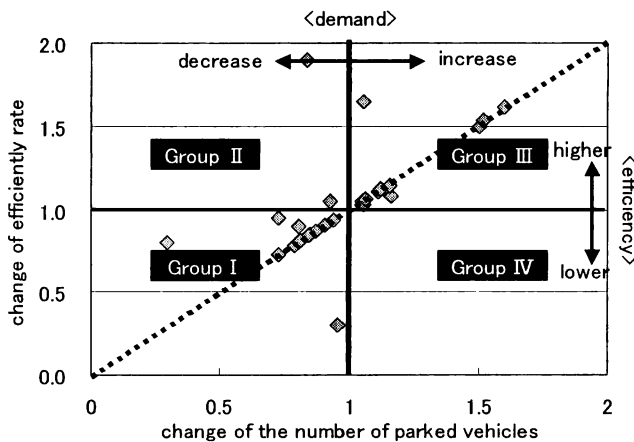
- 1) The number of vehicles in the public parking facilities has decreased year-by-year. See **Figure-2**.
- 2) There was a remarkable relation between the change of efficiently rate (= (number of vehicles in parking facilities)/(capacity of parking spaces)) and the change of the number of parking vehicles. See **Figure-3**.
- 3) Above all, the ratio of facilities that has both decreasing demand and lower efficiency was 50% or more of them. See **Figure-3**.



**Figure-1** Capacity and location of public parking facilities in Osaka prefecture except of Osaka City



**Figure-2** Change of the number of vehicles in public parking facilities



**Figure-3** Relationship of changes between facility efficiency and parking demand (2000/1997).

As a result, it may not be expected to improve the efficiency of parking facilities, even if the capacity according to demand can be supplied in city center of suburb area.

### 3. Deepened analysis of public parking facilities in case study areas

#### 3.1 Case study areas

Based on the geographic feature of Osaka prefecture, suburb areas should be divided into four regions. Therefore in this study, four areas were chosen as the representative area according to each region. See Figure-4.

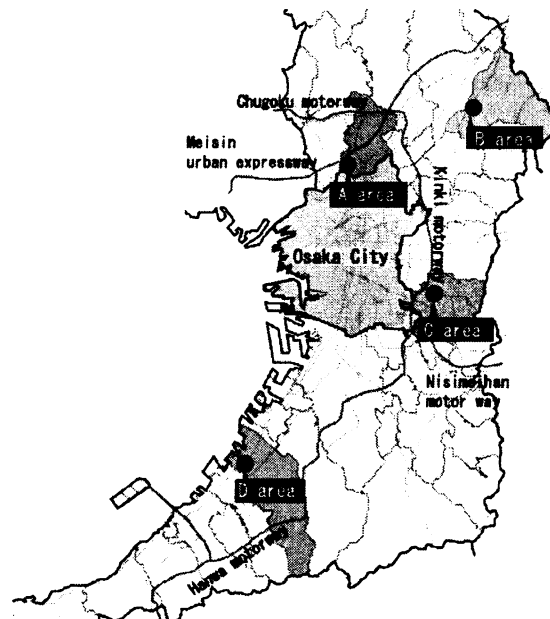


Figure-4 Location of case study areas

#### 3.2 Actual usage conditions of public parking facilities

According to Figure-5, it should be clear that the public parking facilities of each area had remarkable features, as follows;

- 1) In the A area, the ratio of usage has been still high, though both the number of vehicles and the efficient ratio has declined.
- 2) In the B area, the usage condition has little changed at the lower level since 1999.
- 3) The usage conditions of the C area show the similar trend of the B area, but the usage level is higher than that of B area.
- 4) The usage condition of D area has been slightly improved, but the usage level is still lower than other areas. In this area, the use of public parking facilities has been encouraged by introducing the long-stay use for “Park and Ride” or regular customers. As a result, the number of vehicles has increased, but the efficient ratio has little changed.
- 5) One of the reasons why the usage condition has not improved is estimated to be the increase of use of the lower charged private parkings, because the commercial activities have risen in this term.

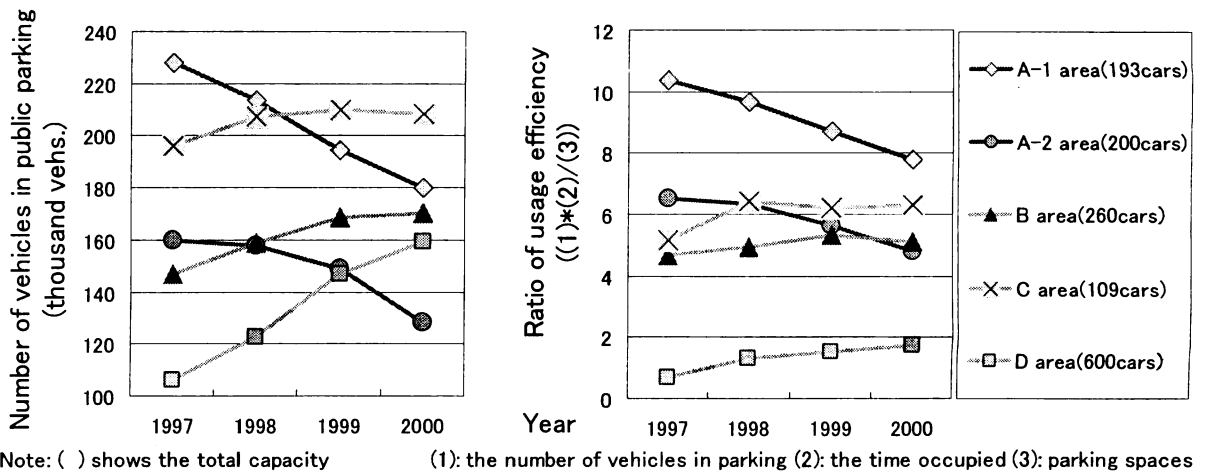


Figure-5 Change of usage conditions of public parking facilities from 1997 to 2000

#### 4. Driver's intension based on questionnaire survey

##### 4.1 Questionnaire survey

The questionnaire surveys concerned with some major questions, such as individual attribute, purposes of car use, intention of car and parking use and comments of urban activities and suitable transport facilities in future. As a result, 553 responses were obtained corresponding to collection rate of 45 %.

##### 4.2 Actual usage conditions of parking facilities from view point of drivers

Four major findings came out of this survey as follows. See figure-6~8.

- 1) In the A area, the purposes of car use were various, such as business, seeing a doctor and so on.
- 2) In the B area, there are many short-stay users for public office or commercial facilities.
- 3) In the C area, the frequency of parking use is relatively low level, because of mainly shopping use.
- 4) The usage type of the D area is remarkably different from other areas, because of the specialized use as commuter.

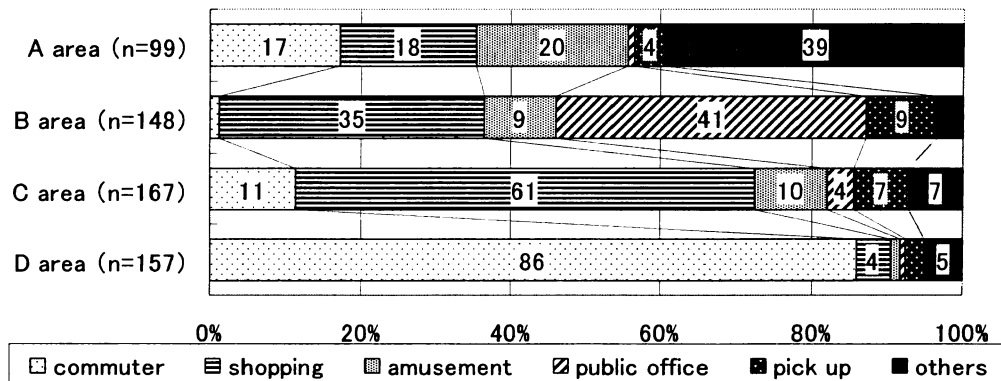


Figure-6 Purposes of car use in city center

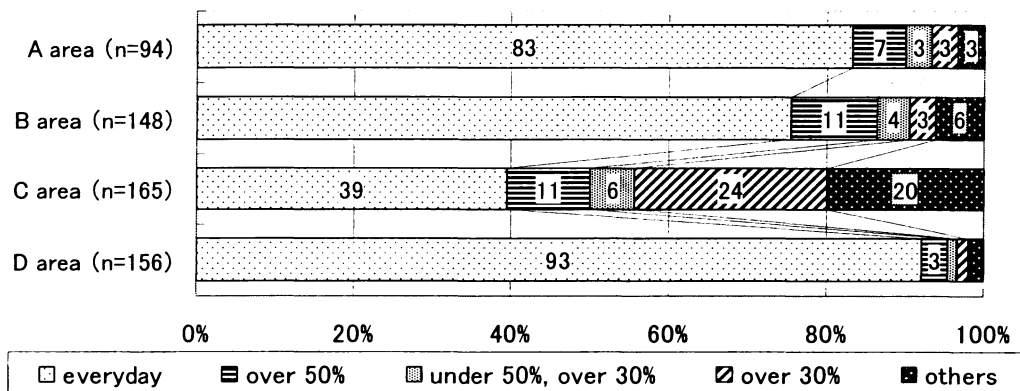


Figure-7 Frequency of parking use in city center

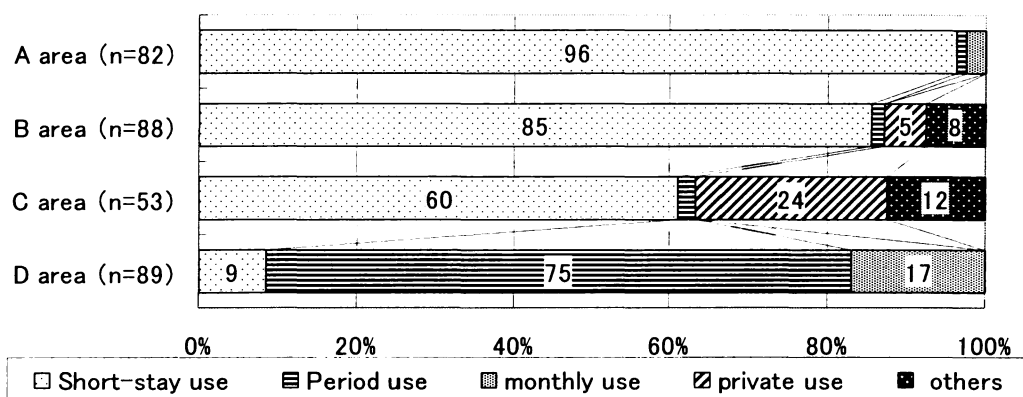


Figure-8 Parking type in city center

#### 4.3 Intension of visiting city center according improvement of transport facilities

As about half of respondents replied that their frequencies will decrease in case of non-parking facilities in the city center, it seems to be considered the degree of dependence on automobiles in suburb areas is remarkably high, as shown in Figure-9. However, it maybe also clear that the supply or improvement of public transport will encourage to visit the city center without automobiles, as shown in Figure-10.

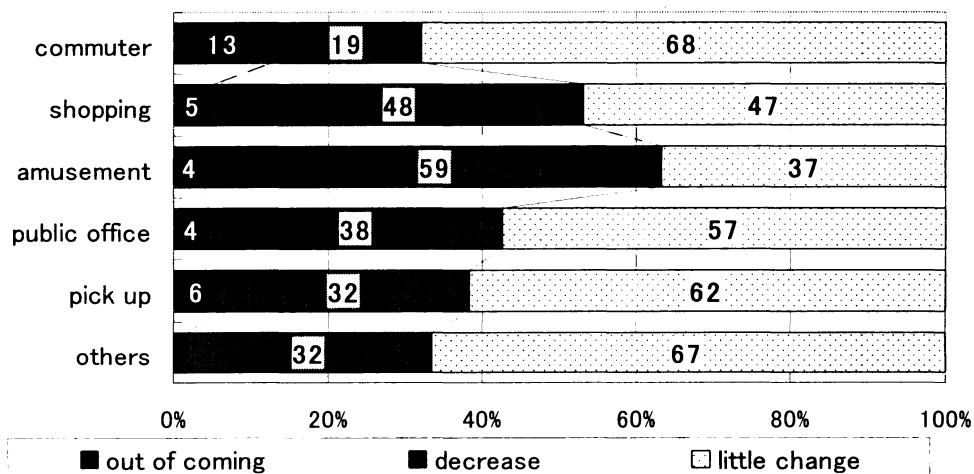


Figure-9 Change of behavior according to purpose in case of non-parking facilities

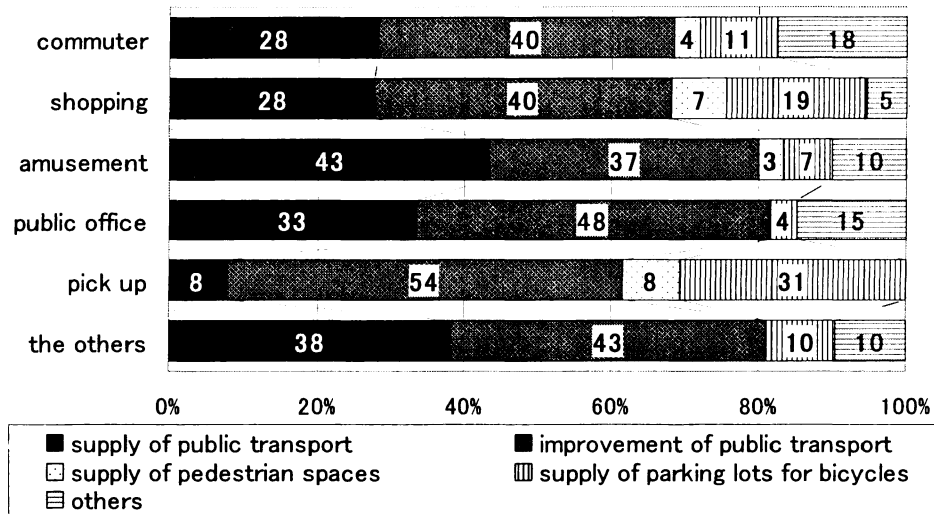


Figure-10 Necessity of transport facilities according to purpose in case of non-parking facilities

## 5. Concluding remarks

According to the results of this study, it was clear that many of public parking facilities have not been efficiently used, in spite of the policy of supply of public parking facilities to correspond to demand of car uses in the city center of suburb areas. On the other hand, it was also clear that the supply and improvement of public transport should encourage many people to visit the city center.

Through these findings, it must be more important to improve the accessibility, in order to activate the urban functions. Therefore, it should be essential issues to investigate the suitable transport facilities to including the fringe parking to heighten the urban activities in the aging society.

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